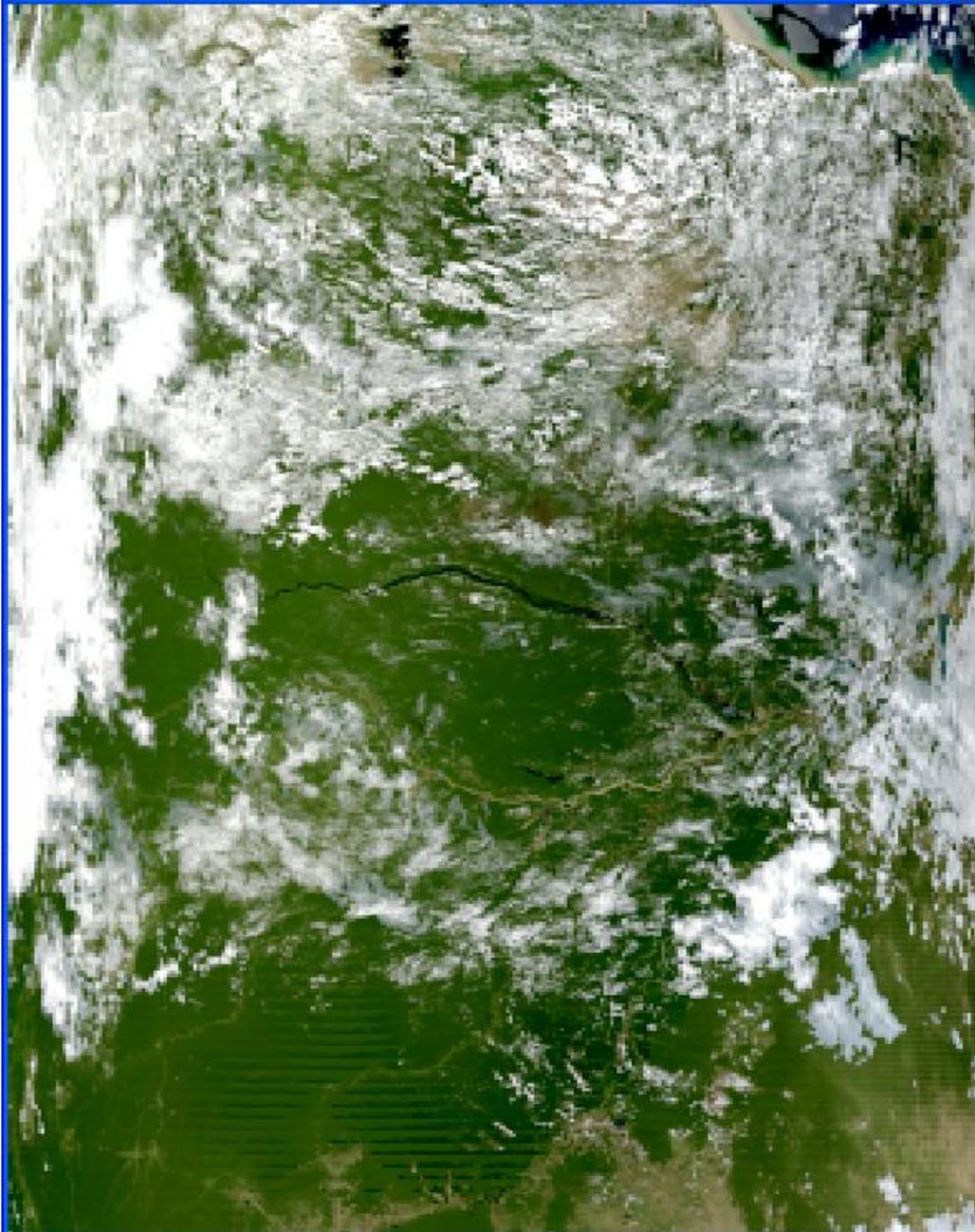


# Polarization sensitivity on Terra: impact on Land surface reflectance products

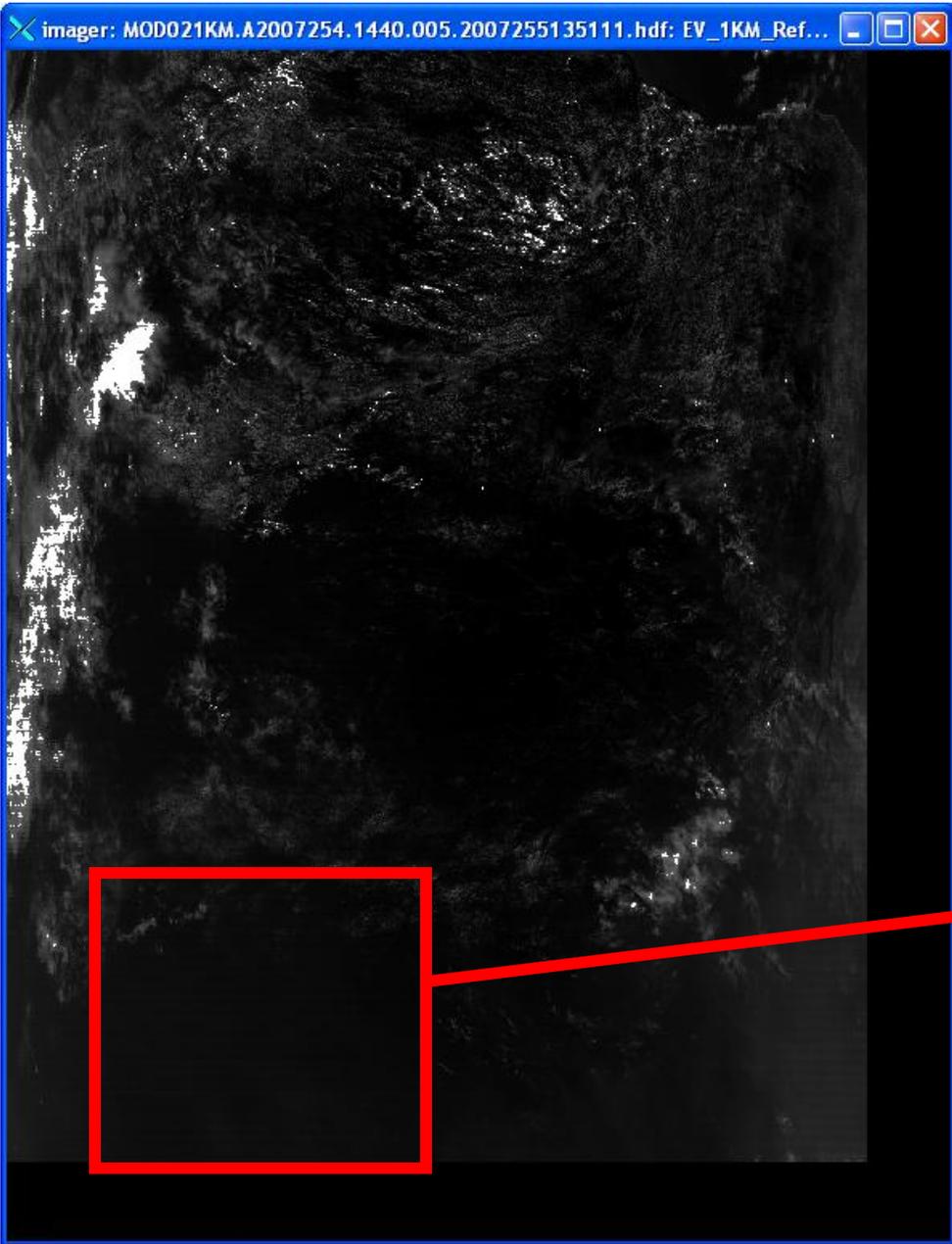
Eric Vermote

Sadashiva Devadiga

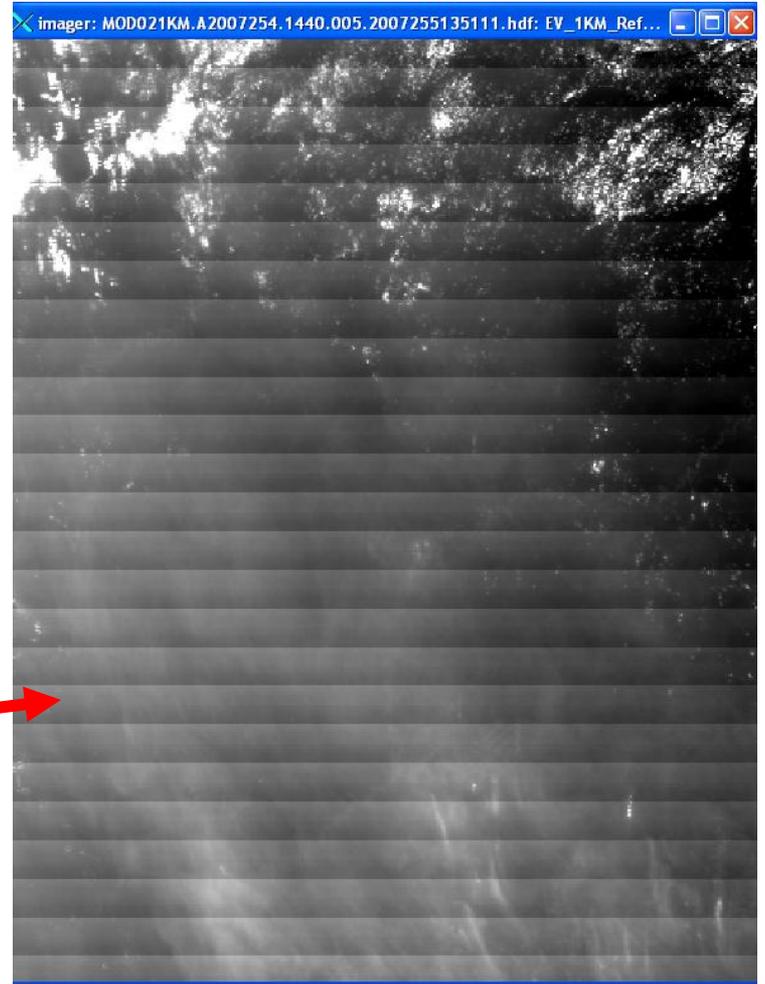
Polarization effect at 412nm depending  
on mirror side for Terra (band 8)



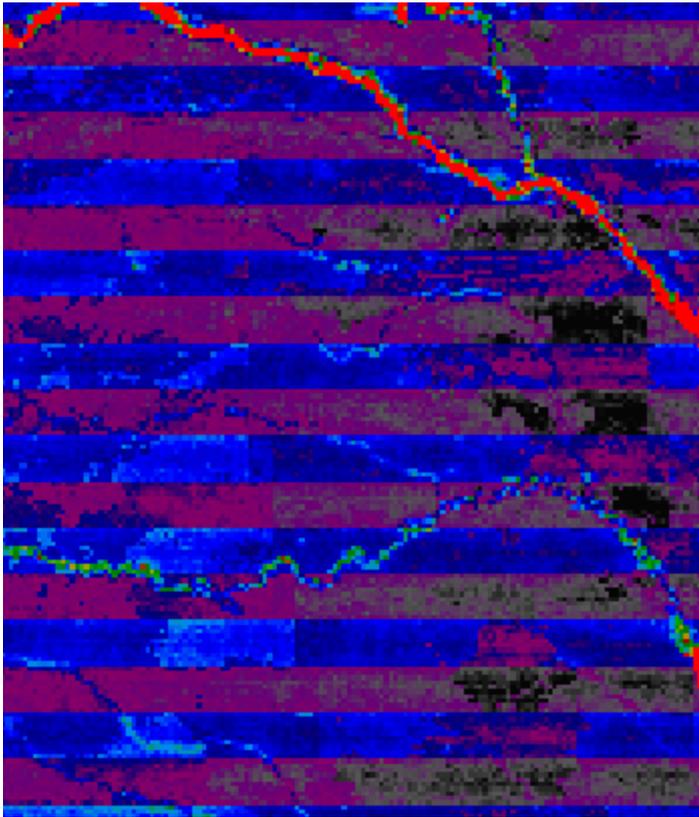
- Pbs detected over the rain forest at high aerosol level (between 0.8-1.2): band 8 noise make the aerosol model switch to high to low absorption



## Band 8/ Band 8 details

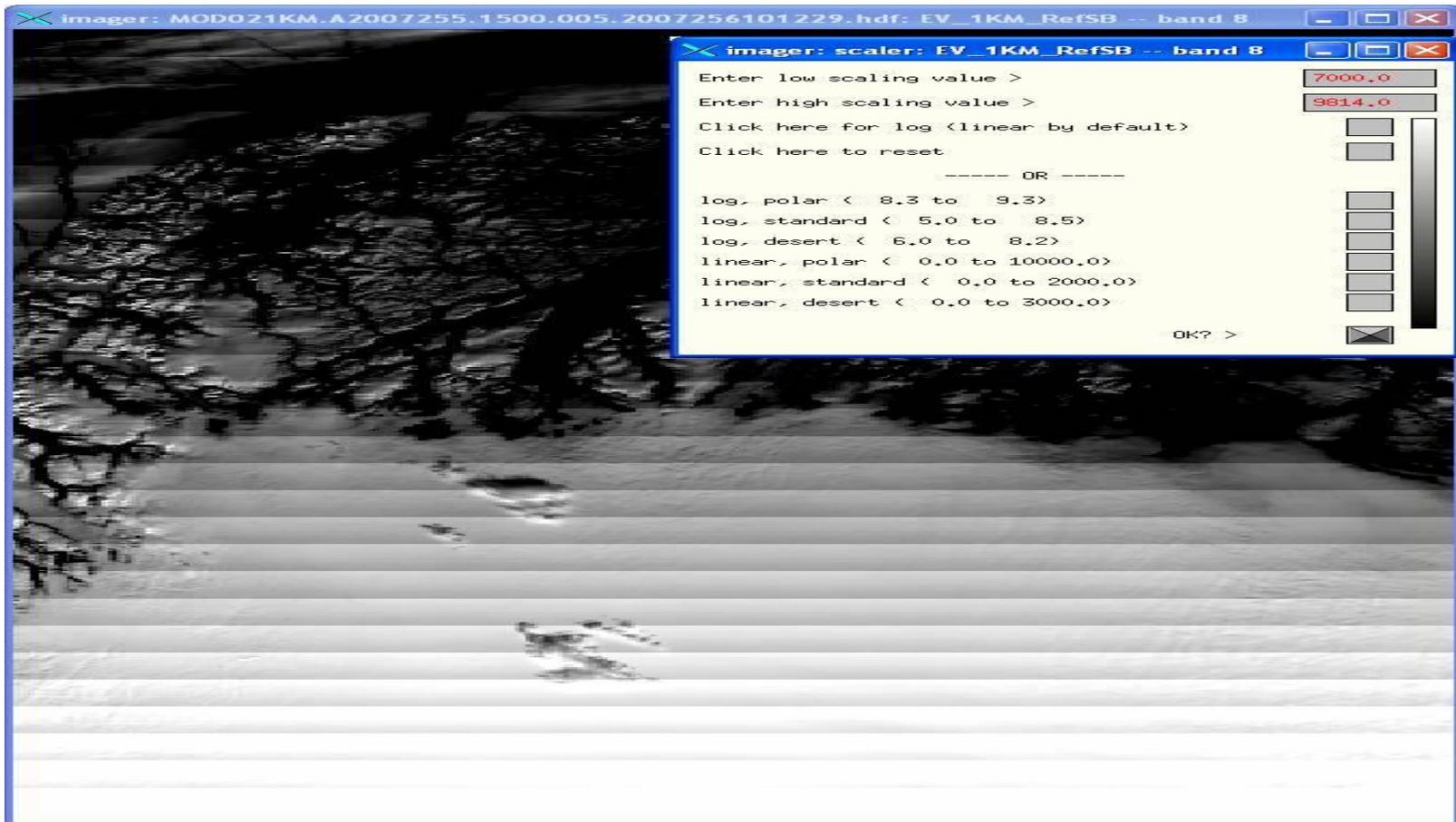


# Terra, Band 8 (412nm) Mirror side calibration artifact



Surface reflectance in band 8, changing  
From +0.007 to -0.003 over a forest area  
in south America.

Mirror side effect in Terra band 8 despite mirror side equalization also visible over snow/ice target (polar zone)



# This is not apparent on Aqua data

The image shows a software interface with two main windows. The left window displays a grayscale satellite image of a coastline, with a dark, forested area on the left and a lighter, possibly urban or developed area on the right. The right window is a dialog box titled "imager: scaler: EV\_1KM\_RefSB -- band 8". It contains several input fields and buttons for scaling parameters. The "Enter low scaling value" field is set to 10000.0, and the "Enter high scaling value" field is set to 13818.0. Below these are buttons for "Click here for log (linear by default)", "Click here to reset", and a vertical slider. Further down, there are several radio button options for different scaling methods: "log, polar", "log, standard", "log, desert", "linear, polar", "linear, standard", and "linear, desert". At the bottom right of the dialog is an "OK?" button. Below the dialog box, a list of band indices is visible, showing bands 12 through 36, with corresponding values.

imager: MYD021KM.A2007255.1205.005.2007257194137.hdf: EV\_1KM\_RefSB -- band 8 current resolution 1 -->

imager: scaler: EV\_1KM\_RefSB -- band 8

Enter low scaling value > 10000.0

Enter high scaling value > 13818.0

Click here for log (linear by default)

Click here to reset

----- OR -----

log, polar < 8.3 to 9.3>

log, standard < 5.0 to 8.5>

log, desert < 6.0 to 8.2>

linear, polar < 0.0 to 10000.0>

linear, standard < 0.0 to 2000.0>

linear, desert < 0.0 to 3000.0>

OK? >

Indexes -- band 12 3

Indexes -- band 13 1

Indexes -- band 14 4

Indexes -- band 15 15

nd 20 315

nd 21 251

nd 22 336

nd 23 326

nd 24 313

nd 25 369

nd 27 113

nd 28 119

nd 29 825

nd 30 869

nd 31 823

nd 32 915

nd 33 157

nd 34 180

nd 35 187

nd 36 233

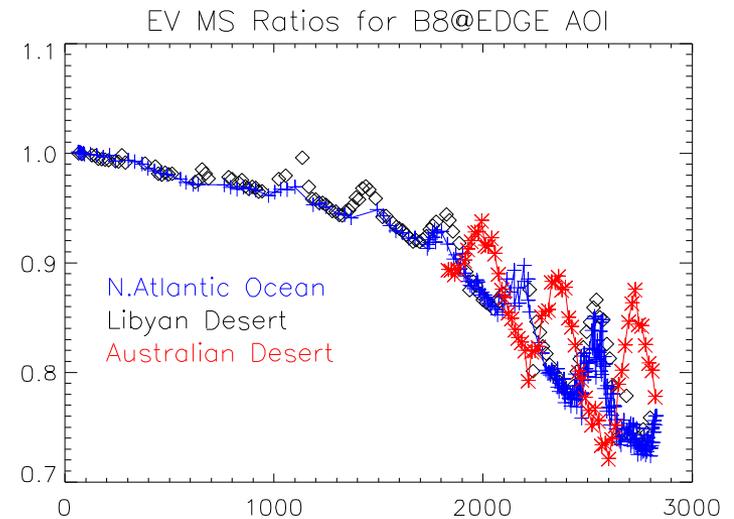
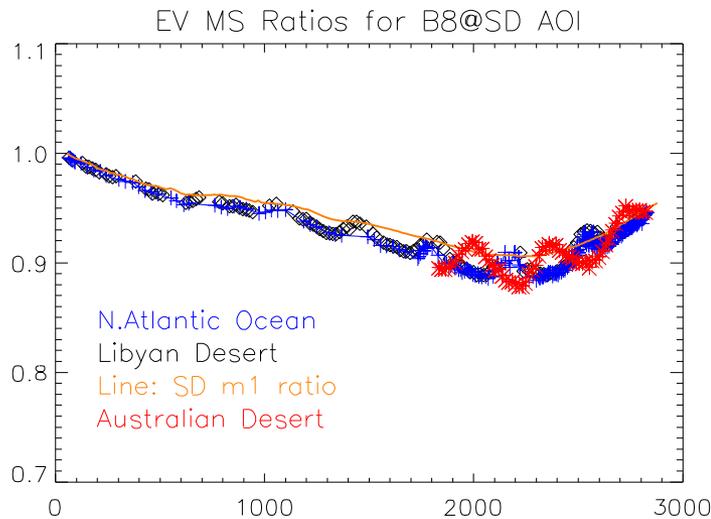
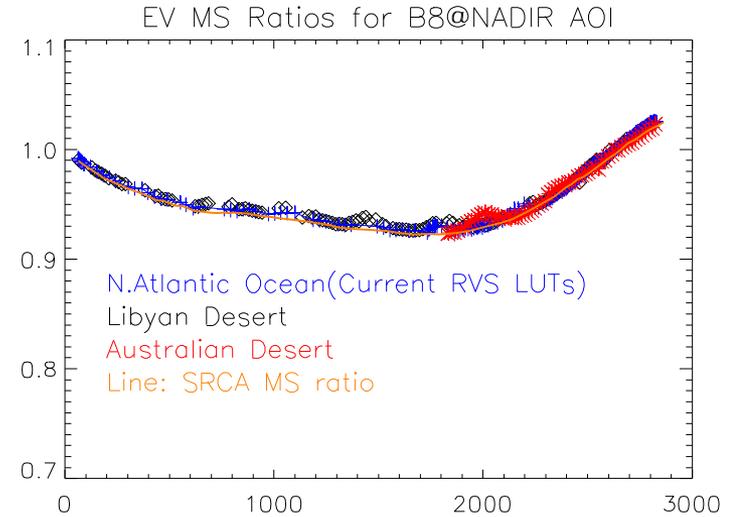
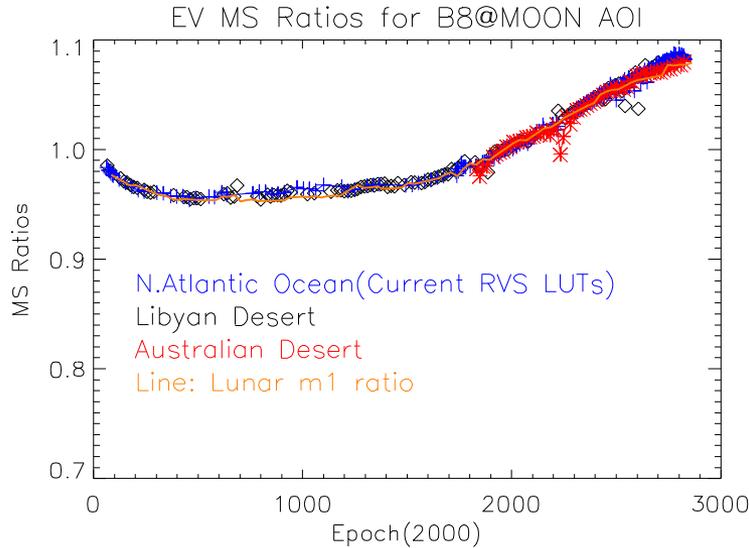
Indexes -- band 1 3

Indexes -- band 2 7

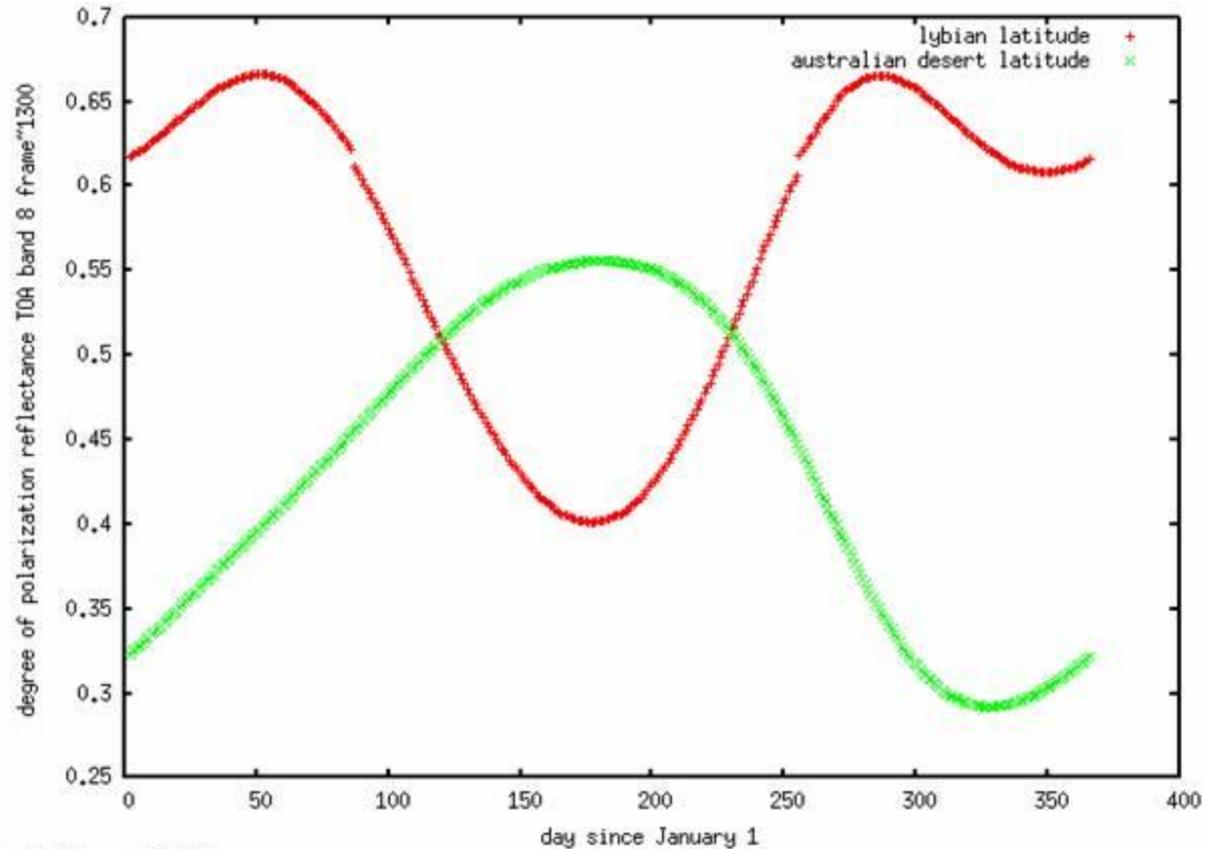
Indexes -- band 3 2

Indexes -- band 4 2

# Terra Mirror side ratio is dependent on AOI (fine) but Australian and Libyan desert give different ratio at EDGE AOI



Polarization simulation over desert sites may explain the previous results: The polarization over Lybia and Australia are out of phase

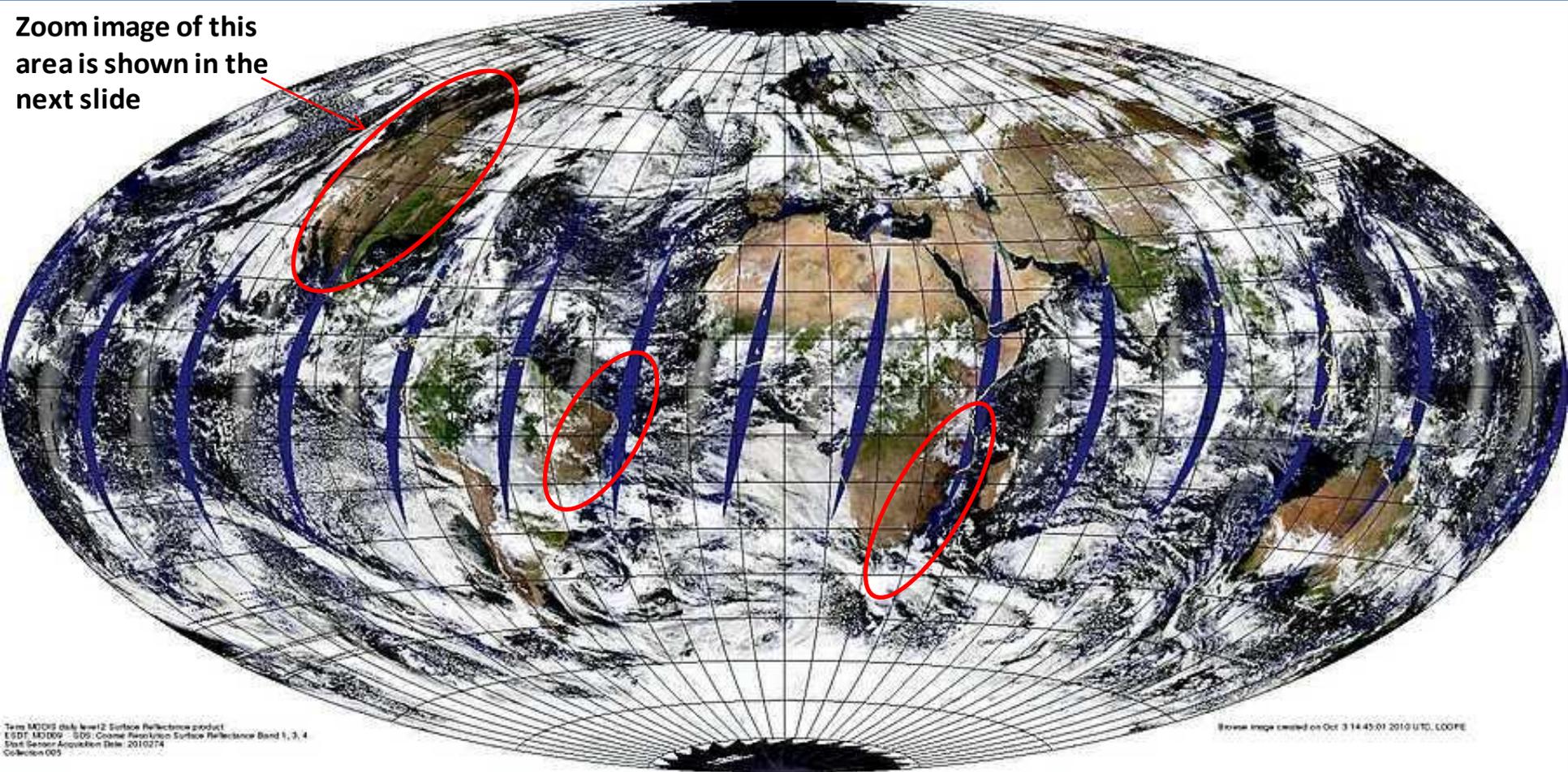


268.104. 0.734163

Polarization problem is now impacting  
Band 3

# Anomaly visible in the Global Browse of Surface Reflectance Terra MODIS: Day 2010-274

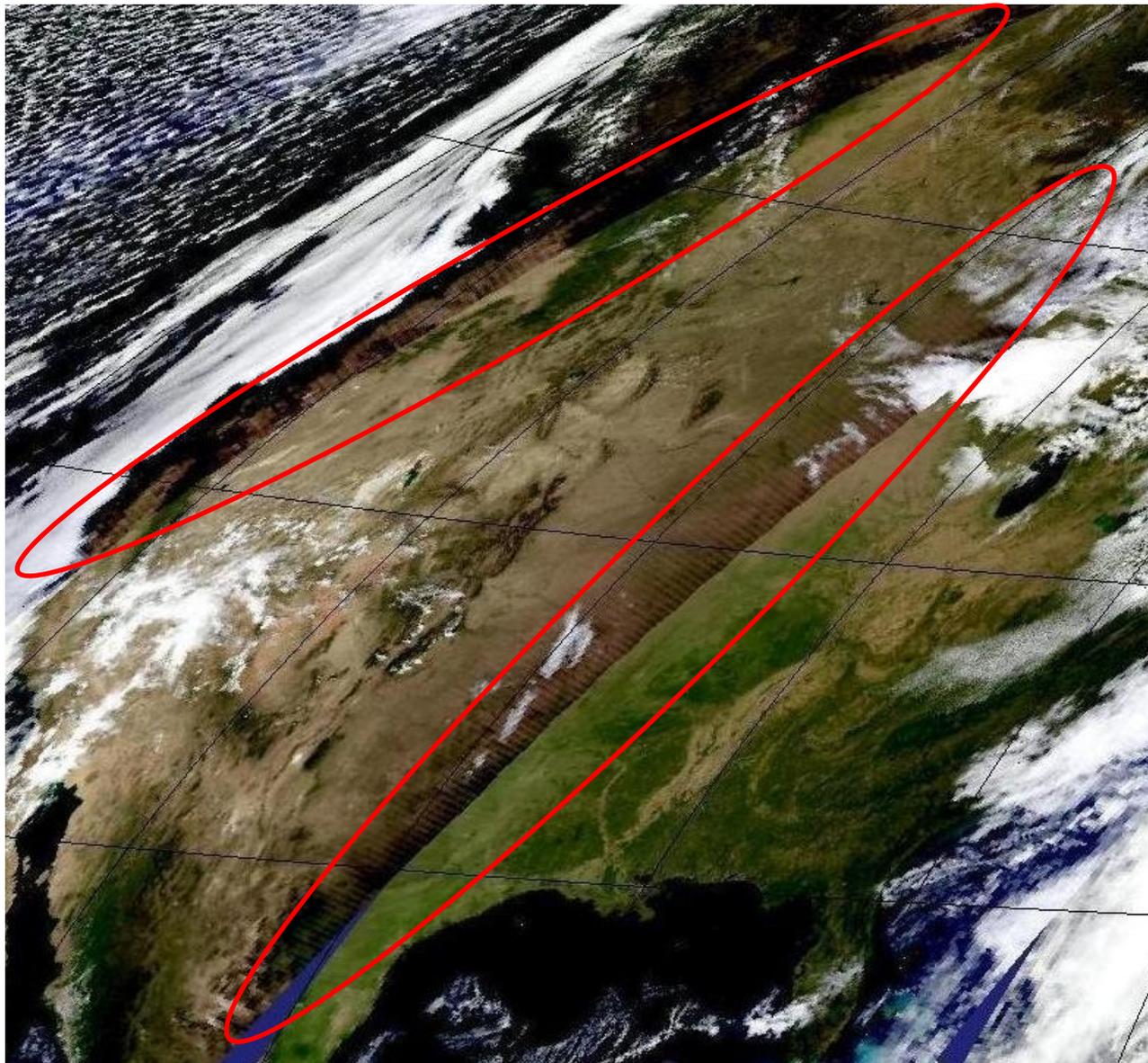
Zoom image of this  
area is shown in the  
next slide



- Image is an RGB composite of Surface Reflectance from bands 1, 4 and 3.
- Anomaly is present only on the right edge of the swath and is visible when AOT using band 3 is retrieved and is used for correcting the reflectance.
- Though the anomaly seems to be systematic and present in every day retrieval, the presence and severity of the anomaly varies and the cause is still not fully understood.

# Surface Reflectance from Terra MODIS Day 2010-274

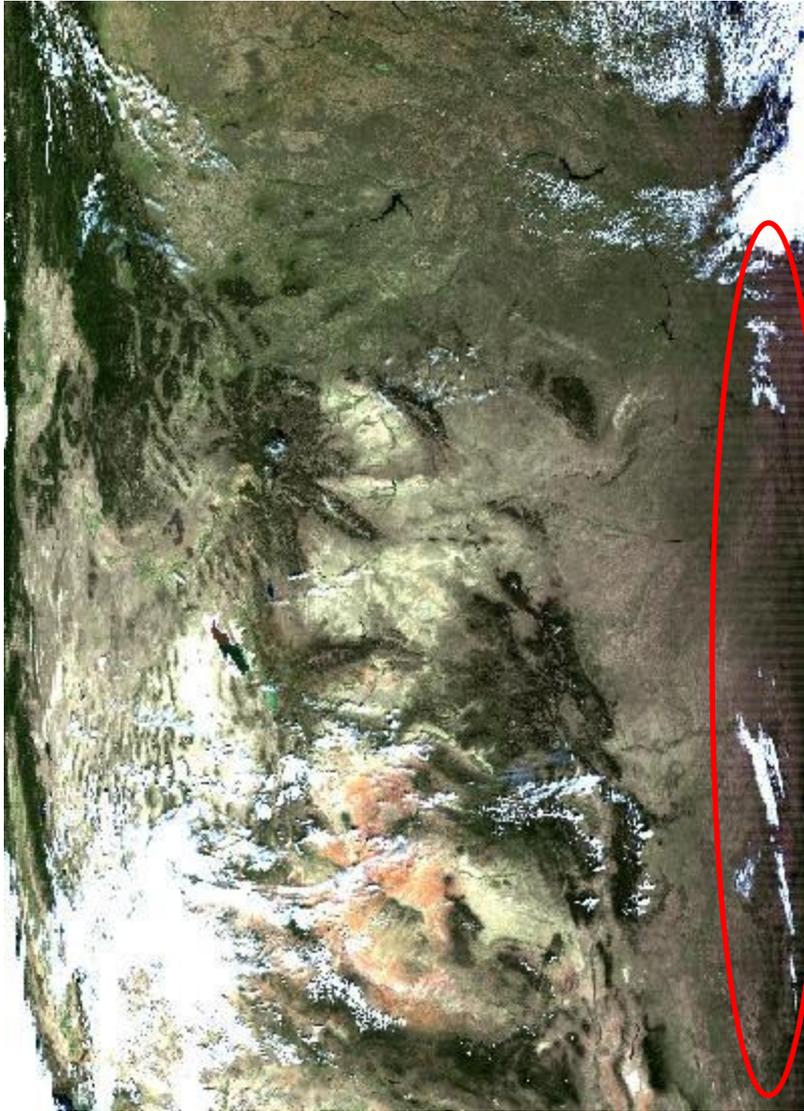
A Spatial Subset (North America) from the browse image



Striping from the mirror side difference is always on the right edge of the swath, at swath angle  $\sim > 60$  deg.

# Terra Granule 18:10 from 2010-274

(from the orbit passing over North America in the previous spatial subset)

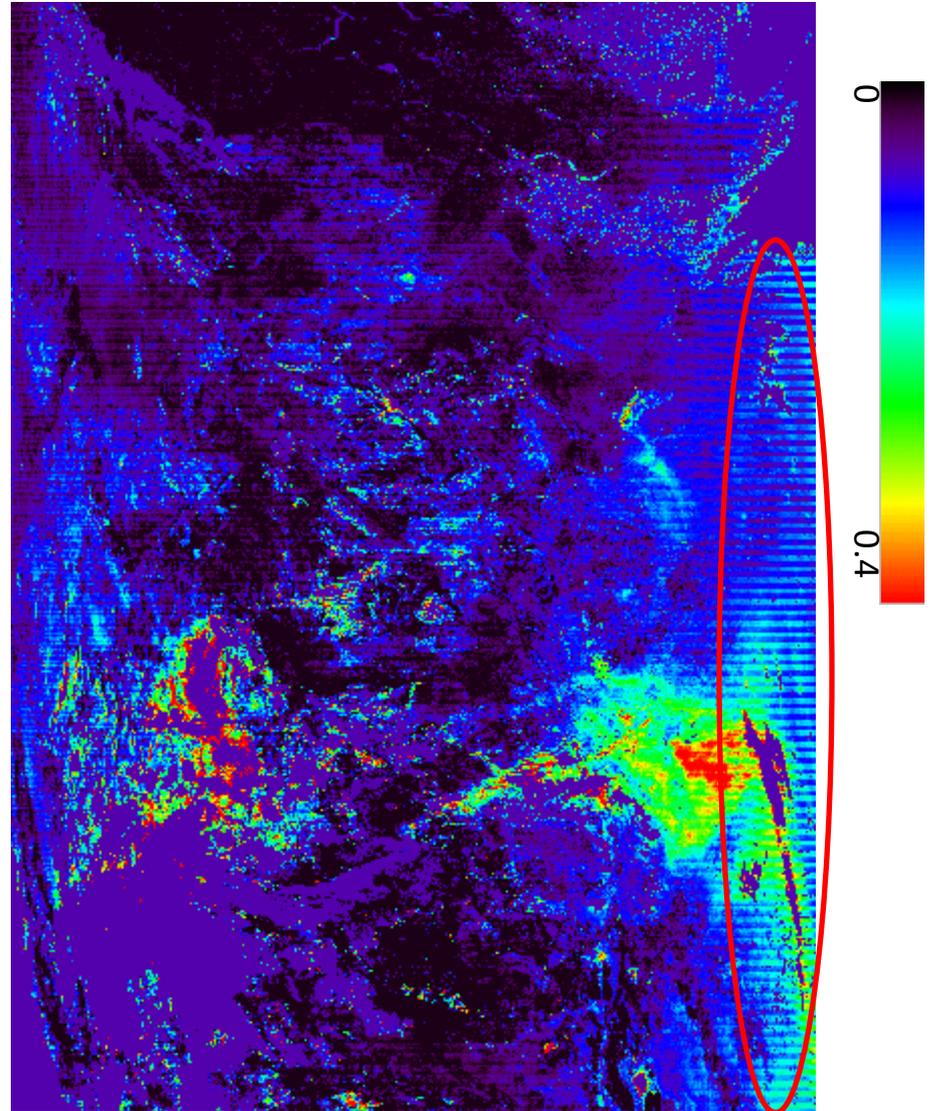
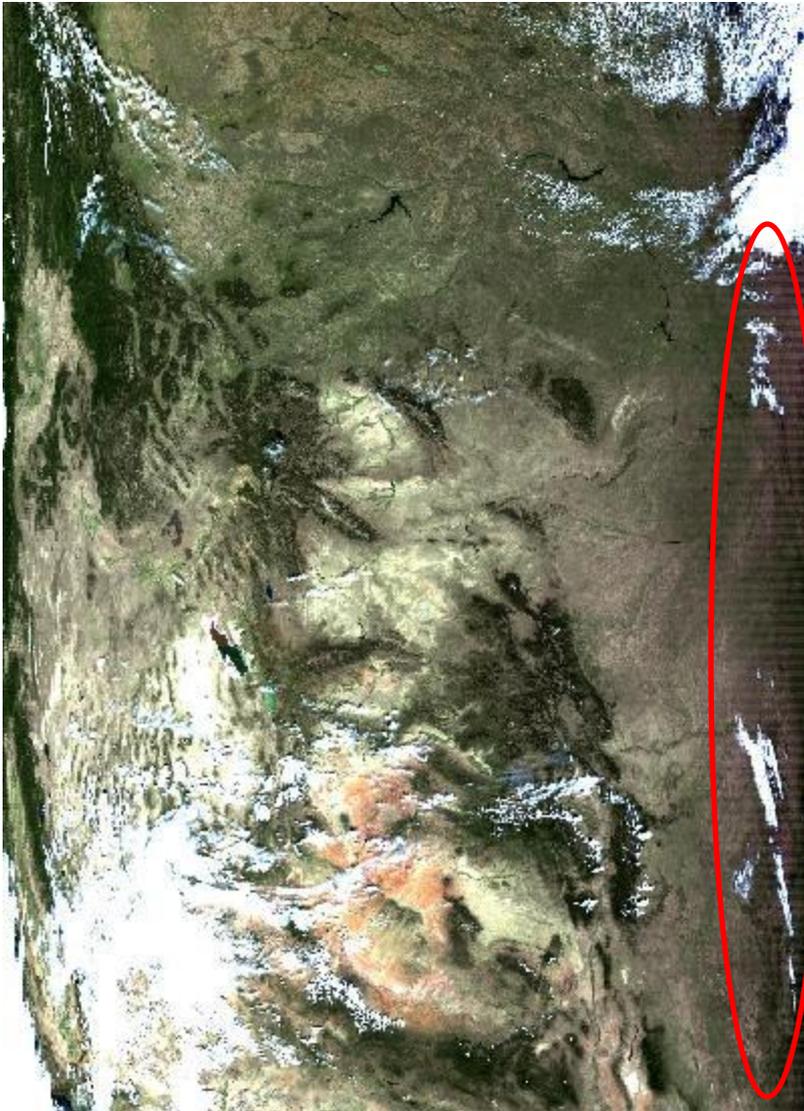


RGB composite of LSR bands 1,3 and 4

L1B: 1km TOA reflectance Band 3

*Striping resulting from overcorrection in the LSR visible on the right side of the granule. Similar striping visible in Band 3 from L1B*

# Terra Granule 18:10 from 2010-274

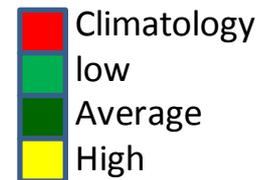
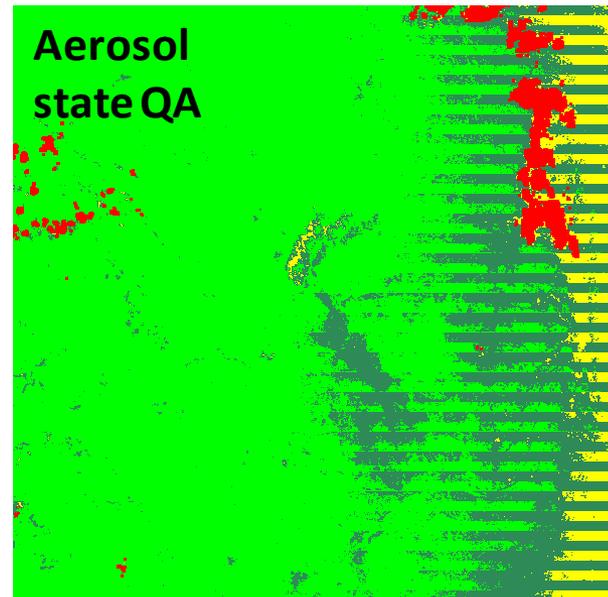
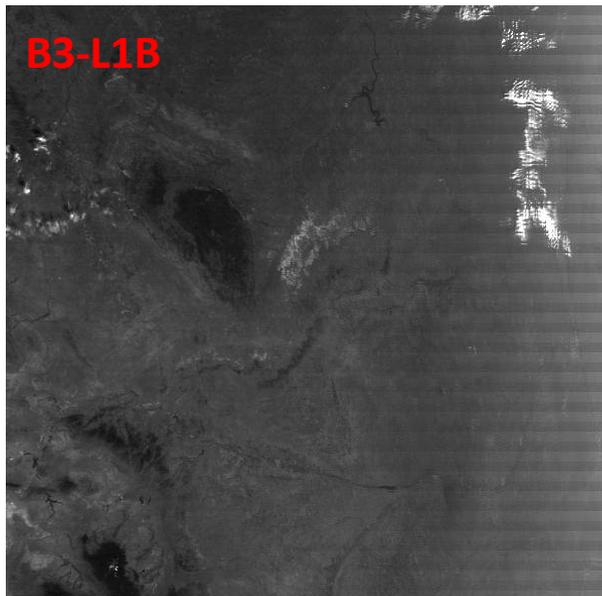
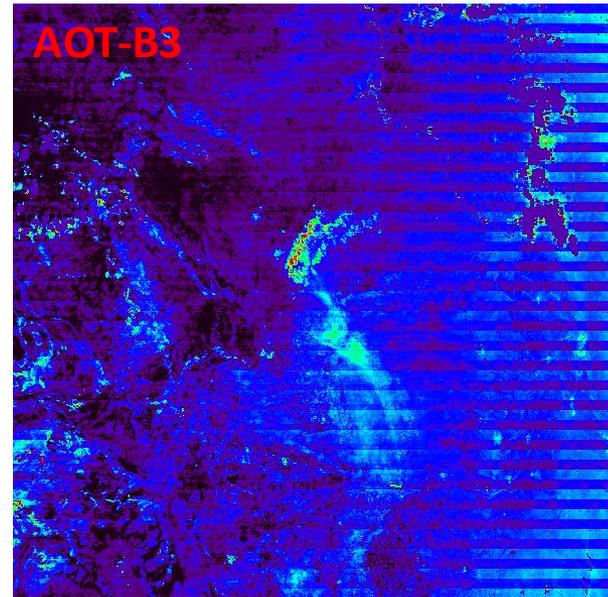
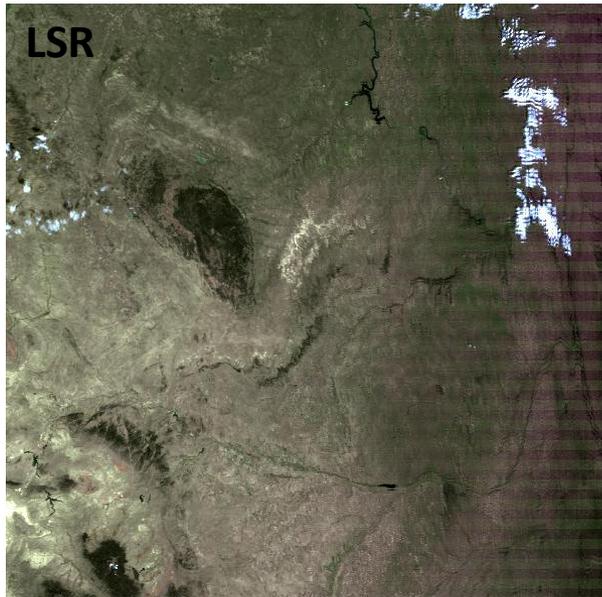


RGB composite of LSR bands 1,3 and 4

Band 3 AOT from MOD09

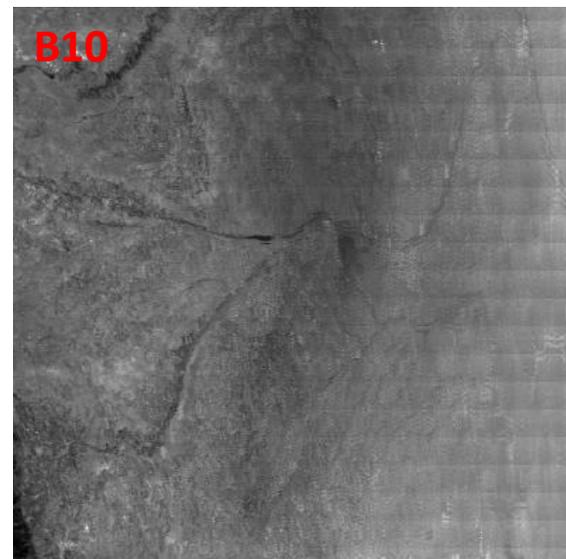
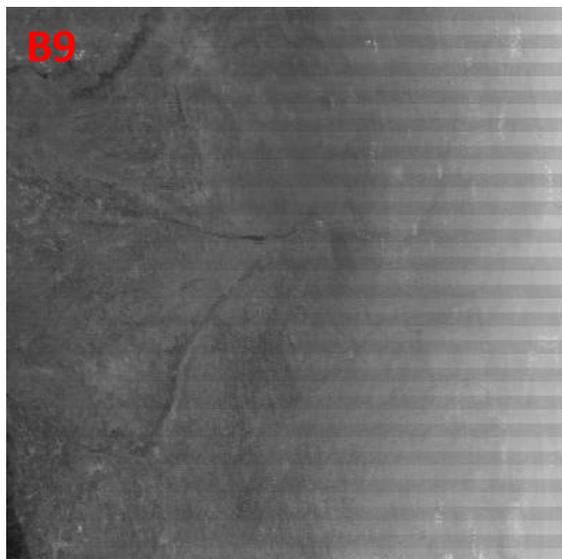
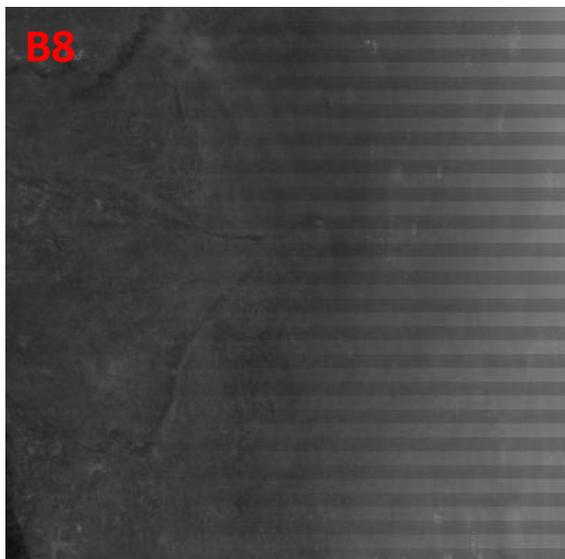
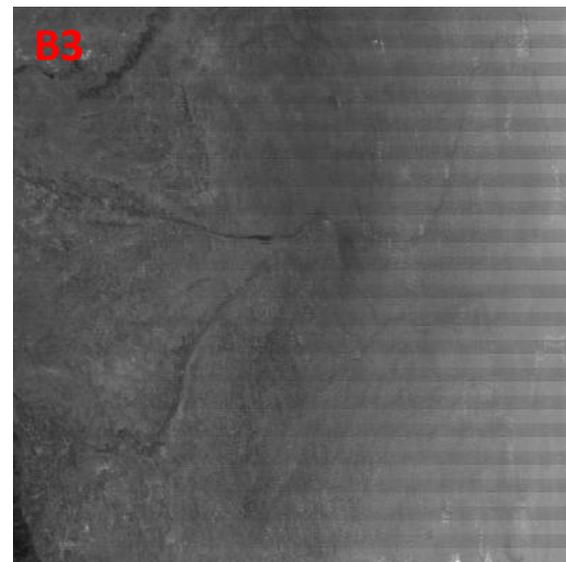
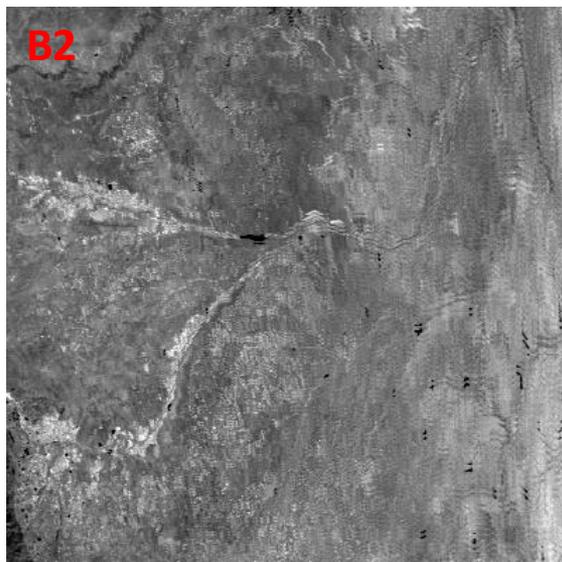
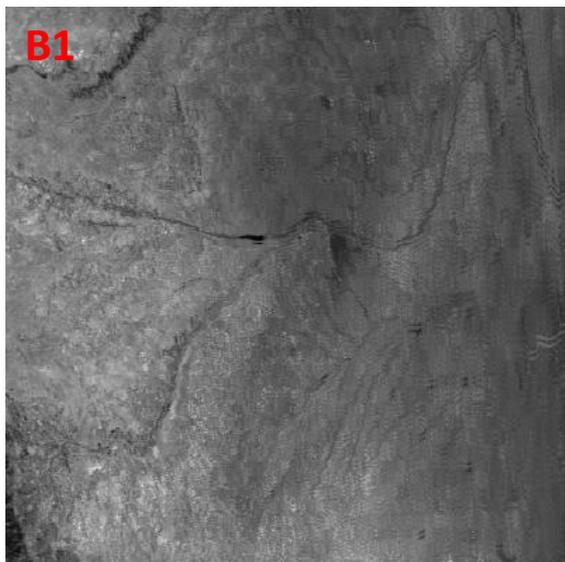
*Striping resulting from overcorrection in the LSR visible on the right side of the granule*

**Spatial Subset from the right side of the granule show overcorrection of LSR in alternate scans. This striping matches the striping seen in L1B band 3.**



# TOA Reflectance in L1B

Spatial Subsets from Terra MODIS L1B Granule: MOD021KM.A2010274.1810.005



**Bands 3, 8 and 9 have identical striping (vertical profile in the next slide). Band 10 may have been affected by single detector striping.**

# Vertical Profile of TOA Reflectance in L1B

MODIS L1B Granule: MOD021KM.A2010274.1810.005 (sample 1325)

